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Conservation Systems Research

Optimal Corn Row Spacing and Plant Populations for Conservation Tillage Systems

RESEARCH PROJECT DESCRIPTION NO. 26



Corn plants create shade between plants and rows, suppressing weed growth.

Researchers

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The Challenge

In the southeastern United States, where short-term water stress is common during the summer, water availability to plants can be a major limitation in non-irrigated fields. Conservation tillage systems provide increased residue cover, which increases organic matter content near the soil surface over time. The residue can improve water conservation by increasing water infiltration and reducing evapotranspiration, potentially increasing the efficiency of any given rainfall event.

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The potential increase in available soil moisture provided by conservation tillage systems may support higher corn plant populations and/or narrower row spacings. Higher plant populations will increase crop residue, to a point, enhancing the benefits of conservation tillage, while decreasing row spacings promotes faster canopy closure. Optimizing interactions between plant populations and row spacings may reduce weed pressure, lower weed control costs, and improve yields, which will improve profitability. Greater canopy cover may suppress weeds to an extent where conventional hybrids can compete with transgenic ones, reducing seed costs.

The Experiment

Experiments at two Alabama Agricultural Experiment Stations will aim to

- determine optimal plant populations in standard and twin row configurations for a conventional and transgenic corn variety, and
- determine the effects of plant populations and row configurations on weed suppression and water availability to corn plants.

The two experimental sites, Belle Mina (northern Alabama) and Fairhope (southern Alabama) differ in their climate, soils, and other ecological factors. These differences will allow us to make observations under different conditions and apply what we learn to more regions.

Corn fields at both sites will use conservation tillage systems with a rye cover crop. The experiments will compare corn hybrids, row spacings, and plant populations to determine optimum combinations. Plant samples, soil samples, and weed populations will be collected at various times during the growing season to monitor crop growth, soil moisture status, and weed pressure. Crop yields will be collected at the end of the growing season.



At normal row spacing, sunlight penetrates the plant canopy.